

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

PUMPING PLANT

(no.)
CODE 533

DEFINITION

A pumping facility installed to transfer water for a conservation need.

PURPOSE

Provide a dependable water source or disposal facility for water management.

CONDITIONS WHERE PRACTICE APPLIES

Wherever water must be pumped to accomplish a conservation objective, which may include but is not limited to one of the following:

To provide a water supply for such purposes as irrigation, recreation, livestock, or wildlife.

To maintain water levels in wetlands.

To transfer waste as part of a comprehensive nutrient management plan.

To provide drainage.

CRITERIA

The efficiency of units, type of power, quality of building, automation features, and other accessories shall be designed to support the economic and environmental value of the system to accomplish the conservation objectives.

Criteria for the design of components not addressed in Natural Resources Conservation Service (NRCS) practice standards shall be consistent with sound engineering principles.

Laws and regulations. This practice must conform to all federal, state, and local laws and regulations. Laws and regulations of particular concern include those involving water and drainage rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Pump requirements. Capabilities, range of operating heads, and general class and efficiency of equipment shall be determined by appropriate technical means. Size and number of pumps and their performance shall be

determined on the basis of system requirements needed to meet the intended purpose. Total head shall be determined for critical operating conditions, taking into account all hydraulic losses. Automatic controls shall be included as required.

Pumps utilized for the transfer of wastewater or manure shall be the type and size needed to transfer material at the required head and flow rate. Pump type shall be based on the consistency of material being pumped and manufacturer's recommendations.

The capacity (gallons per minute) of pumps installed in wells must be based on the capacity of the well to produce water. Generally, pump capacity should not exceed 90 percent of well capacity.

Power units. Power units shall be selected on the basis of availability of fuel, power costs, operating conditions, conservation needs, and objectives, including the need for automation. The power unit shall be matched to the pump and be capable of operating the pump efficiently and effectively within the range of operating conditions. Horsepower needed, pump efficiency and total head on the pump shall be computed.

Internal combustion engines must not be loaded to more than 80 percent of manufacturer's power rating. This rating must be further reduced for temperature, altitude, and motor accessories.

Electric motors must not be loaded to more than 100 percent of manufacturer's power rating, with reduction for any high operating temperature.

Suction and discharge pipes. The size of suction and discharge pipes shall be based on hydraulic analysis, operating cost, and compatibility with other system components. Gates, valves, pipe connections, discharge bays, and other appurtenances shall be installed, as needed, for satisfactory operation.

Federal, state, and local laws and regulations concerning back flow prevention shall be followed when pumping from wells or when chernigating.

Conservation practice standards are reviewed periodically and updated if needed. The current version of this standard is on our eFOTG web site available at www.sd.nrcs.usda.gov or may be obtained at your local Natural Resources Conservation Service.

Building and accessories. Design of the pumping plant shall consider accessibility for maintenance, and the need for protecting equipment from the elements, vandalism, and fire. The appearance of the plant shall be compatible with the surrounding environment. Applicable building codes shall be met.

Foundations shall be designed to safely support the loads imposed and shall be protected from deterioration.

Pumps mounted in the open or other aggressive environment must be designed for long service life in those conditions.

Suction bays (or sumps) shall be structurally sound and meet manufacturer's requirements. Trash racks shall be provided as needed.

Discharge bays or connections with distribution systems shall be structurally sound and meet hydraulic requirements.

Provide adequate safety features to protect workers and the public from injury.

CONSIDERATIONS

Consider effects on upstream and downstream water quantity and quality.

Consider potential for ground and/or surface pollution by lubricants, fuels, fertilizer and/or other materials used at the pumping plant.

Consider needed protection of the system from floods, winter and other exposure conditions.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing pumping plants shall meet this standard and describe the requirements needed to achieve the purpose.

OPERATION AND MAINTENANCE

An Operation and Maintenance Plan specific to the facilities installed shall be prepared for use by the owner/operator. The plan shall provide specific instructions for operating and maintaining the facility to ensure it functions as designed. The plan shall include the following, as a minimum:

Periodic inspection and testing of all pumping plant components and appurtenances.

Proper start-up procedures for operation of the pumping plant.

Routine maintenance of all mechanical components following manufacturer's recommendations.

Where applicable, power units and fuel/chemical storage facilities including pipes shall be frequently checked for chemical, fuel, or lubricant leaks, and repaired as needed.

Remove debris as necessary from trash racks and structures.

Remove sediment from suction bays.

Inspect and maintain anti-siphon devices.

Routinely test and inspect all automation components of the pumping plant.

Inspect and maintain secondary containment facilities, if applicable.

Periodically inspect safety features to ensure they are in place and functional.

Prior to retrofitting electrically powered equipment, electrical service must be disconnected and the absence of stray electrical current verified.

REFERENCES

USDA-NRCS National Engineering Handbook, Section 16, Drainage

USDA-NRCS National Engineering Handbook, Section 15, Irrigation

National Electrical Code

National Standard Plumbing Code